CLAIMS

1. A holographic image corrector comprising,
   a) an optical system having an objective,
   b) at least one pinhole mounted before said objective,
   c) means for recording the characteristics of said objective by sending a first coherent beam through said pinhole and through said objective or reflecting said beam therefrom to form an object beam,
   d) means for intersecting said object beam with a reference coherent beam in a recording medium to form a hologram of said objective,
   e) means to replace said pinhole with an article and
   f) means to illuminate said article with a coherent beam like one of the above, so that light therefrom passes through or reflects off said objective and diffracts through or off said hologram and provides a corrected image of said article.
2. A holographic image corrector comprising,
   a) an optical system having an objective,
   b) a pinhole mounted before said objective,
   c) means for recording the characteristics of said objective by sending a first coherent beam through said pinhole and through said objective or reflecting said beam therefrom to form an object beam,
   d) means for intersecting said object beam with a reference coherent beam in a recording medium to form a hologram of said objective,
   e) means to replace said pinhole with an article and
   f) means to illuminate said article with a coherent beam like one of the above, so that light therefrom passes through or reflects off said objective and diffracts through or off said hologram and provides a corrected image of said article.
3. The image corrector of claim 2 wherein said objective is a lens.
4. The image corrector of claim 2 wherein said objective is a concave mirror.
5. The image corrector of claim 4 wherein said mirror is tilted to an off-axis position.

6. The image corrector of claim 2 wherein said pinhole is a spatial filter mounted before said objective and means for sending said first coherent beam through said spatial filter and thence through said objective.

7. The image corrector of claim 2 wherein said optical system is at a working distance from said article of up to at least 10 in. ~~or more~~.

8. The image corrector of claim 2 wherein said objective is up to at least 8 in. ~~or more~~ in diameter.

9. The image corrector of claim 2 wherein said objective and said hologram are mounted in a microscope.

10. The image corrector of claim 6 wherein said objective and said hologram are mounted in a microscope.

11. The image corrector of claim 7 wherein said objective and said hologram are mounted in a microscope.

12. The image corrector of claim 2 wherein a first spatial filter or a pinhole is mounted before said objective and a second spatial filter is mounted in the path of the reference beam before it interferes with said object beam.

13. The image corrector of claim 2 wherein said objective is selected from the group consisting of a mirror, a lens, a fresnel lens and a zone plate.

14. The image corrector of claim 2 employed for viewing objects at a distance including those inside a vacuum system or in an gaseous atmosphere.

15 A method for image correction comprising,

a) recording the characteristics of an optical system having an objective, by sending a first coherent beam through a pinhole and through said objective or reflecting said first beam therefrom to form an object beam,

b) intersecting said object beam with a reference coherent beam in a recording medium to form an interference pattern or hologram thereof,

c) replacing said pinhole with an article and

d) illuminating said article with a coherent beam like one of the above so that light therefrom passes through or reflects off said objective and diffracts through or off said hologram, to provide a corrected image of said article.

16. The method of claim 15 employing an objective-lens system at a working distance of up to 10 in. ~~or more from~~ said article to serve as a long distance microscope.

17. The method of claim 15 wherein the object beam is passed through at least one pinhole and then through the objective and the reference beam is passed through at least one pinhole before interfering with said object beam.

18. A method for image correction comprising,

a) passing a coherent beam through a beam splitter to form separate beams 1 & 2,

b) directing beam 1 through a first pinhole to illuminate ~~the~~ objective and define an object beam,

c) directing beam 2 through a second pinhole to a collimating lens to define a reference beam and then into interference with said object beam in a recording medium to define a hologram,

d) removing said first pinhole before the objective and replacing said pinhole with the article to be viewed and

e) illuminating said article by a coherent beam so that light therefrom passes through or reflects off said objective and through an imaging lens to diffract through or off said hologram to reconstruct the original reference beam but with article information retained, to correct for defects in said objective and to provide an accurate image in a recording medium or for viewing.

19. A corrective hologram maker comprising,

a) an optical system having an objective,

b) a pinhole mounted before said objective

c) means for recording the characteristics of said objective by sending a first coherent beam through said pinhole and through said objective or reflecting said beam therefrom to form an object beam and

d) means for intersecting said object beam with a reference coherent beam in a recording medium to form a hologram thereof that can correct for defects in said objective.

20. A method for making a hologram comprising,

a) recording the characteristics of an optical system having an objective, by sending a first coherent beam through a pinhole and through said objective or reflecting a first beam therefrom to form an object beam and

b) intersecting said object beam with a reference coherent beam in a recording medium to form an interference pattern or hologram thereof that can correct for defects in said objective.

21. A holographic image corrector comprising,

a) an optical system having an objective,

b) an array of pinholes mounted before said objective,

c) means for recording the characteristics of said objective by sending a first coherent beam through said array and through said objective or reflecting said beam therefrom to form an object beam,

d) means for intersecting said object beam with a reference coherent beam in a recording medium to form a hologram of said objective,

e) means to replace said array with an article and

f) means to illuminate said article with a ~~coherent~~ like one of the above beam, so that light therefrom passes through or reflects off said objective and diffracts through or off said hologram and provides a corrected image of said article.

22. The image corrector of claim 21 wherein said objective is a lens.

23. The image corrector of claim 21 wherein said objective is a concave mirror.

24. The image corrector of claim 23 wherein said mirror is tilted to an off-axis position.

25. The image corrector of claim 21 wherein said optical system is at a working distance from said article of up to at least 10 in. ~~or more~~.

26. The image corrector of claim 21 wherein said objective is up to at least 8 in. ~~or more~~ in diameter.

27. The image corrector of claim 21 wherein said objective and said hologram are mounted in a microscope.

28. The image corrector of claim 25 wherein said objective and said hologram are mounted in a microscope.

29. The image corrector of claim 21 wherein a first array of pinholes is mounted before said objective and a second array of pinholes is mounted in the path of the reference beam before it interferes with said object beam.

30. The image corrector of claim 21 wherein said objective is selected from the group consisting of a mirror, a lens, a fresnel lens and a zone plate.

31. The image corrector of claim 25 employed for viewing objects at a distance including those inside a vacuum system or in an unstable atmosphere.

32 A method for image correction comprising,

a) recording the characteristics of an optical system having an objective, by sending a first coherent beam through an array of pinholes and through said objective or reflecting said first beam therefrom to form an object beam,

b) intersecting said object beam with a reference coherent beam in a recording medium to form an interference pattern or hologram thereof,

c) replacing said array with an article and

d) illuminating said article with a coherent beam like one of the above so that light therefrom passes through or reflects off said objective and diffracts through or off said hologram, to provide a corrected image of said article.

33. The method of claim 32 employing an objective-lens ~~system~~ at a working distance of ~~up to~~ at least 10 in. ~~or more~~ from said article to serve as a long distance microscope.

34. The method of claim 32 wherein said object beam is passed through an array of pinholes to illuminate the objective and the reference beam is passed through an array of pinholes before interfering with said object beam.

35. The method of claim 32 wherein said object beam and said reference beam are each passed through a pinhole array to obtain a microscope of relatively large field of view.

36 The method of claim 32 wherein when an array of pinholes is employed in the object beam before the objective and in the reference beam, and when said object beam is passed through said hologram, said reference beam is also directed at said hologram as before to form an interference pattern of light and dark fringes superimposed on said image, to provide a contour plot thereof.

37. A method for image correction comprising,

a) passing a coherent beam through a beam splitter to form separate beams 1 & 2,

b) directing beam 1 through a first array of pinholes to illuminate the objective and define an object beam,

c) directing beam 2 through a second array of pinholes to a collimating lens to define a reference beam and then into interference with said object beam in a recording medium to define a hologram,

d) removing said first array of pinholes and replacing said array with the article to be viewed and

e) illuminating said article by a coherent beam so that light therefrom passes through or reflects off said objective and through an imaging lens to diffract through or off said hologram to reconstruct the original reference beam but with article information retained, to correct for defects in said objective and to provide an accurate image in a recording medium or for viewing.

38 A holographic image corrector comprising,

a) an optical system having an objective,

b) an array of pinholes mounted before said objective,

c) means for recording the characteristics of said objective by sending a first coherent beam through said array and through said objective or reflecting said beam therefrom to form an object beam and

d) means for intersecting said object beam with a reference coherent beam in a recording medium to form a hologram thereof that can correct for defects in said objective.

39 A method for objective correction comprising,

a) recording the characteristics of an optical system having an objective, by sending a first coherent beam through an array of pinholes and through said objective or reflecting said first beam therefrom to form an object beam and

b) intersecting said object beam with a reference coherent beam in a recording medium to form an interference pattern or hologram thereof that can correct for defects in said objective.